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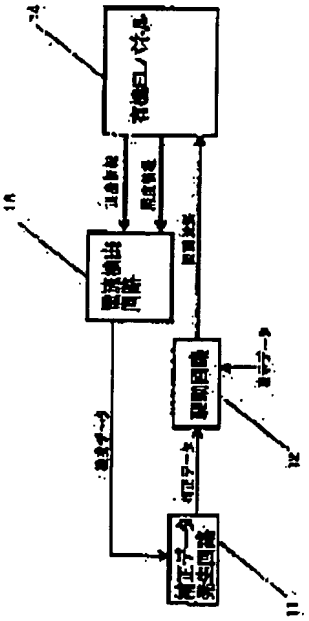
(54) ORGANIC EL DISPLAY DEVICE AND ORGANIC EL ELEMENT DRIVING METHOD

(57)Abstract:
PROBLEM TO BE SOLVED: To provide an organic EL device having a compact size and a light weight, capable of display and eliminating the use of extra power, without using an external sensor.
SOLUTION: The intensity of a light radiated to an organic EL panel 14 and the temperature of the organic EL panel 14 are measured by measuring a current value with a given voltage impressed on an organic EL element. The emission brightness of the organic EL panel 14 is adjusted to an optimum in a driving circuit 12 in accordance with obtained information. Thus, the organic EL panel 14 has bright emission in a bright area without using an external sensor and emission such that it is not dazzling in a dark area to provide easy-to-see and beautiful display.



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CLAIMS

[Claim(s)]
[Claim 1] The organic electroluminescence display characterized by having the display-element organic EL device which displays information, and an organic EL device for measurement for measuring temperature or an illuminance.
[Claim 2] The organic electroluminescence display according to claim 1 characterized by equipping said organic EL device for measurement with the organic EL device for thermometries for measuring temperature, and the organic EL device for illumination photometry for measuring an illuminance according to an individual.
[Claim 3] The organic electroluminescence display according to claim 1 or 2 characterized by forming said display display-element organic EL device and said organic EL device for measurement in the same organic EL panel.
[Claim 4] The organic electroluminescence display for measurement according to claim 2 characterized by said organic EL device for thermometries and said organic EL device for illumination photometry being the same area.
[Claim 5] The organic electroluminescence display according to claim 2 characterized by being shaded with the case with which said organic EL device for illumination photometry incorporates said display-element organic EL device.
[Claim 6] The organic electroluminescence display characterized by having the display-element organic EL device which displays information, the organic EL device for measurement for measuring temperature or an illuminance, the amendment data generating circuit which creates amendment data based on the measurement result of said organic EL device for measurement, and the drive circuit which impresses the drive wave according to said amendment data and indicative data to said display-element organic EL device.
[Claim 7] The drive approach of the organic EL device characterized by measuring the optical reinforcement currently irradiated by said organic EL device by applying an electrical potential difference to the organic EL device in the condition that light is irradiated, and measuring a current value, and amending the luminescence reinforcement of said organic EL device based on said measurement result.
[Claim 8] The drive approach of the organic EL device characterized by measuring the optical reinforcement currently irradiated by said organic EL device by applying an electrical potential difference to the organic EL device in the condition that light is irradiated, and measuring a current value, and amending the luminescence reinforcement of the organic EL device for a display based on said measurement result.
[Claim 9] The drive approach of the organic EL device characterized by measuring the temperature of said organic EL device and amending the luminescence reinforcement of said organic EL device based on said measurement result by shading an organic EL device, applying an electrical potential difference to the organic EL device in the condition that outdoor daylight is not irradiated, and measuring a current value.
[Claim 10] The drive approach of the organic EL device characterized by measuring the temperature of said organic EL device and amending the luminescence reinforcement of the organic EL device for a display based on said measurement result by shading an organic EL

device, applying an electrical potential difference to the organic EL device in the condition that outdoor daylight is not irradiated, and measuring a current value.
[Claim 11] The drive approach of an organic EL device given in any 1 term of claims 7-10 characterized by said electrical potential difference applied to said organic EL device being a reverse bias.
[Claim 12] The drive approach of the organic EL device characterized by amending the luminescence reinforcement of said organic EL device by making into optical reinforcement the difference of the current value which applied and measured the electrical potential difference to the organic EL device in the condition that light is irradiated, and the current value which applied and measured the electrical potential difference to said organic EL device in the condition that outdoor daylight is not irradiated.
[Claim 13] The drive approach of the organic EL device characterized by amending the luminescence reinforcement of the organic EL device for a display by making into optical reinforcement the difference of the current value which applied and measured the electrical potential difference to the organic EL device for illumination photometry in the condition that light is irradiated, and the current value which applied and measured the electrical potential difference to the organic EL device for thermometries in the condition that outdoor daylight is not irradiated.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention changes the luminescence reinforcement of a display element according to the external environment on which an organic EL panel is put about the drive approach of the organic electroluminescence display which has an organic EL device, and an organic EL device, and relates to the amendment circuit for displaying by the always optimal luminescence reinforcement.
[0002]
[Description of the Prior Art] The block diagram of the conventional organic EL device drive approach is shown in drawing 5 . Moreover, drawing 6 is the top view showing the appearance of the conventional organic electroluminescence display module. The illuminance information on external is supplied to a detector 53 from temperature information and the illuminance sensor 52 from the thermo sensor 51 of drawing 5 , and the temperature information and illuminance information which are sent analogically are changed into digital data, and it is sent to the amendment data generating circuit 54 in a detector 53. In the amendment data generating circuit 54, data processing for which it opted beforehand from the property of detection data and an organic EL device determines luminescence brightness, and the drive circuit 55 is supplied as amendment data. From amendment data and an indicative data, the drive circuit 55 generates a drive wave and impresses it to an organic EL panel 56. [0003] As shown in drawing 6 , in the former, an organic EL panel 62 is prepared independently and the thermo sensor 64 and the photosensor 65 are installed in the organic electroluminescence display module 61. A photodiode, a photo transistor, etc. are used for illuminance sensors, such as a thermistor and a thermocouple, at a thermo sensor 64. Moreover, a detector 53, the amendment data generating circuit 54, and the drive circuit 55 are established in the tooth back of the organic electroluminescence display module 61.
[0004] An organic EL panel 56 emits light by the brightness amended with temperature and an external illuminance, can emit light brightly and can make extent which is not dazzling emit light in a dark location by the above configurations in a bright location.
[0005]
[Problem(s) to be Solved by the Invention] When using a luminescence display panel as a drop, it changes also by the same luminescence brightness with environments to be used, and is visible. In strong outdoor daylight, such as sunlight, luminescence brightness can be raised and a beautiful legible indication can be given by lowering luminescence brightness in dark rooms, such as a dark room. Moreover, in the drop of pocket devices, such as a wrist watch, small and low power are required and it is not necessary to use excessive power by making it moderate luminescence brightness according to the environment to be used for a cell drive. Therefore, by a conventional configuration and a conventional approach, the illuminance sensor 65 and the thermo sensor 64 were formed independently [an organic EL panel 62 or the drive circuit 55]. Therefore, the organic electroluminescence display module 61 becomes large, and will become expensive, There was a problem that an error might arise since the sensor is placed apart from the organic EL panel again.

[0006]
[Means for Solving the Problem] In the drive approach of the organic EL device of this invention, the optical reinforcement currently irradiated by the organic EL panel and the temperature of an organic EL panel are measured by measuring the current value when applying a fixed electrical potential difference to an organic EL device as a means to solve the above-mentioned technical problem. In a drive circuit, the luminescence brightness of an organic EL panel is adjusted the optimal based on the information acquired here. A beautiful legible indication can be given also in the environment where illuminances differ by this, without using an external sensor. [0007]
[Embodiment of the Invention] Below, the gestalt of implementation of the drive approach of the organic electroluminescence display by this invention and an organic EL device is explained. That is, it was presupposed to the organic electroluminescence display by this invention that it has the display-element organic EL device which displays information, and an organic EL device for measurement for measuring temperature or an illuminance. And it becomes possible to adjust luminescence brightness according to a surrounding environment by amending the luminescence reinforcement of an organic electroluminescence display based on the temperature or the illuminance which the organic EL device for measurement measured.
[0008] Here, if both the organic EL devices for illumination photometry for measuring the organic EL device for thermometries and illuminance for measuring temperature as an organic EL device for measurement are carried and the luminescence reinforcement of an organic electroluminescence display is amended as m

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TECHNICAL FIELD

[Field of the Invention] This invention changes the luminescence reinforcement of a display element according to the external environment on which an organic EL panel is put about the drive approach of the organic electroluminescence display which has an organic EL device, and an organic EL device, and relates to the amendment circuit for displaying by the always optimal luminescence reinforcement.

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PRIOR ART

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[0004] An organic EL panel 56 emits light by the brightness amended with temperature and an external illuminance, can emit light brightly and can make extent which is not dazzling emit light in a dark location by the above configurations in a bright location.

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EFFECT OF THE INVENTION

[Effect of the Invention] By using the organic EL device drive approach of this invention, it can be made to display by the luminescence brightness doubled with the external environment, without using an external sensor, and small and the organic electroluminescence display module in which a lightweight and legible display is possible can be offered. For this reason, the effectiveness by being able to raise the completeness as a product, if it uses for the product with which small and low power low-cost fashionability, such as a wrist watch, are demanded, and using this invention is large.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] When using a luminescence display panel as a drop, it changes also by the same luminescence brightness with environments to be used, and is visible. In strong outdoor daylight, such as sunlight, luminescence brightness can be raised and a beautiful legible indication can be given by lowering luminescence brightness in dark rooms, such as a dark room. Moreover, in the drop of pocket devices, such as a wrist watch, small and low power are required and it is not necessary to use excessive power by making it moderate luminescence brightness according to the environment to be used for a cell drive. Therefore, by a conventional configuration and a conventional approach, the illuminance sensor 65 and the thermo sensor 64 were formed independently [an organic EL panel 62 or the drive circuit 55]. Therefore, the organic electroluminescence display module 61 becomes large, and will become expensive. There was a problem that an error might arise since the sensor is placed apart from the organic EL panel again.

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MEANS

[Means for Solving the Problem] In the drive approach of the organic EL device of this invention, the optical reinforcement currently irradiated by the organic EL panel and the temperature of an organic EL panel are measured by measuring the current value when applying a fixed electrical potential difference to an organic EL device as a means to solve the above-mentioned technical problem. In a drive circuit, the luminescence brightness of an organic EL panel is adjusted the optimal based on the information acquired here. A beautiful legible indication can be given also in the environment where illuminances differ by this, without using an external sensor. [0007] [Embodiment of the Invention] Below, the gestalt of implementation of the drive approach of the organic electroluminescence display by this invention and an organic EL device is explained. That is, it was presupposed to the organic electroluminescence display by this invention that it has the display-element organic EL device which displays information, and an organic EL device for measurement for measuring temperature or an illuminance. And it becomes possible to adjust luminescence brightness according to a surrounding environment by amending the luminescence reinforcement of an organic electroluminescence display based on the temperature or the illuminance which the organic EL device for measurement measured.
[0008] Here, if both the organic EL devices for illumination photometry for measuring the organic EL device for thermometries and illuminance for measuring temperature as an organic EL device for measurement are carried and the luminescence reinforcement of an organic electroluminescence display is amended as mentioned above, it will become possible to display the optimal brightness in a surrounding environment (temperature, brightness). Moreover, the organic EL device and the organic EL device for measurement which are used for a display can also be formed in the same organic EL panel.

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EXAMPLE

[Example] The block diagram of the drive approach of the organic EL device of this invention is shown in drawing 1. The current detector 13 tells temperature information and illuminance information to the reception amendment data generating circuit 11 by measuring the current value when applying a fixed electrical potential difference to the organic EL device the temperature prepared in the organic EL panel 14, and for illumination photometry.
[0010] The amendment data generating circuit 11 transmits amendment data to the drive circuit 12 from the relation between the data obtained from the current detector 13, the illuminance set up beforehand, and luminescence brightness. The drive circuit 12 is made to emit light by the optimal brightness suitable for an external environment by generating a drive wave and being impressed by the organic EL panel 14 from amendment data and an indicative data. 5V are impressed to an organic EL device by the reverse bias, and the result of having measured the current value is shown in Table 1. [0011]
[Table 1]

有機ＥＬ素子面積　２ｍｍ²
室温　２５℃

照度（１ｘ）	電流値（μＡ）
３２０	３．０
２５００	３．５

[0012] The top view of the organic EL panel 21 in connection with this invention is shown in drawing 2 . 7 segment display element 22 of a comparatively big 8-character configuration is formed in left-hand side, and double figures 7 segment display element of 4 figures and a comparatively small 8-character configuration is prepared in right-hand side at the organic EL panel 21. It is the luminescence display panel for a clock display which displays the time of time of day by 4 figures of this left-hand side, and displays a second by the double figures of right-hand side. Moreover, it is prepared in the location where EL element 23 for illumination photometry abandons, and EL element 24 for thermometries is shaded by the outer frame of a case or a module inside in addition to 7 segment display-element 22. [0013] The circuit diagram which explains the example of the organic EL device drive approach of this invention to drawing 3 is shown. Switches 303 and 304 are attached in the terminal of EL element 302 for a display, and it changes to the condition of connecting with the condition of displaying by connecting between the drive circuit 309 and GND, Vcc, and the current detector 301, and measuring an illuminance. In this example, since it can measure on an about [5V] high electrical potential difference, it is impressing by the reverse bias, but forward bias is sufficient as long as it is the electrical potential difference of extent which does not emit light. [0014] In the current detector 301, a switch 303 is connected to resistance 305 and a current value is measured by detecting the electrical potential difference of the both ends of resistance 305. Specifically it changes after magnification in the voltage amplification circuit 306, the electrical potential difference of the both ends of resistance 305 is changed into digital data by A/D converter 307, and it outputs as detection data. In the amendment data generating circuit 308, luminescence brightness is

determined from the relation between the data detected in the current detector 301, the illuminance beforehand prepared by ROM etc., and the optimal luminescence brightness of an organic EL device 302, and the amendment data is outputted to the drive circuit 309. [0015] A drive wave is made from amendment data and an indicative data, and EL element 302 for a display is made to emit light in the drive circuit 309. Moreover, while making light emit, a switch 303 is connected to the drive circuit 309, and the switch 304 is connected to GND. The synchronizing signal generating circuit 310 generated and supplies the synchronizing signal required for switches 303 and 304, A/D converter 307, the amendment data generating circuit 308, and the drive circuit 309.
[0016] Drawing 4 is a circuit diagram for explaining another example of the organic EL device drive approach of this invention. EL element 404 for illumination photometry and EL element 405 for thermometries are created by the organic EL panel 402 at the same process other than EL element 403 for a display, and EL element 405 for thermometries is created in the location shaded by the case or the outer frame. In the current detector 401, it connects with EL element 404 for illumination photometry, and EL element 405 for thermometries, and a switch 406 changes temperature and an illuminance, and can measure now. It is outputted as illuminance data with which the switch 406 was specifically first connected to EL element 404 for illumination photometry, and it changed after magnification in the voltage amplification circuit 408, it changed the electrical potential difference of the both ends of resistance 407 into the digital data by A/D converter 409, and the temperature error was included. Next, it connects with EL element 405 for thermometries, and a switch 406 carries out same measurement, and is outputted as temperature data.
[0017] In the amendment data generating circuit 410, from the illuminance data detected in the current detector 401, temperature data are lengthened, it considers as illuminance data, the optimal luminescence brightness is determined, and the amendment data is outputted to the drive circuit 410. The relation between an illuminance, the optimal luminescence brightness and temperature, and luminescence brightness is beforehand prepared by ROM etc. like a precedent. A drive wave is made from amendment data and an indicative data, and EL element 403 for a display is made to emit light in the drive circuit 410. The synchronizing signal generating circuit 412 generated and supplies the synchronizing signal required for a switch 406, A/D converter 409, the amendment data generating circuit 410, and the drive circuit 411.
[0018] The approach except inserting resistance as the amperometry approach and measuring an electrical potential difference here may be used. Moreover, A/D, an amendment data generating circuit, and a drive circuit may be analogically processed besides processing in digital one.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The block diagram of the organic EL device drive approach of this invention
[Drawing 2] The top view of the organic EL panel driven by the organic EL device drive approach of drawing 1
[Drawing 3] The circuit diagram for explaining the organic EL device drive approach of this invention
[Drawing 4] The circuit diagram for explaining the another organic EL device drive approach of this invention
[Drawing 5] The block diagram showing the conventional example
[Drawing 6] The top view of the organic electroluminescence display module in which the conventional example is shown
[Description of Notations]
11, 308, 410, 54 Amendment data generating circuit
12, 309, 411, 55 Drive circuit
13,301,401 Current detector
14, 21, 402, 56, 62 Organic EL panel
22, 302, 403, 63 EL element for a display
23,404 EL element for illumination photometry
24,405 EL element for thermometries
303, 304, 406 Switch
305 407 Resistance
306 408 Voltage amplification circuit
307 409 A/D converter
310 412 Synchronizing signal generating circuit
311 413 CPU
51 64 Thermo sensor
52 65 Illuminance sensor
53 Detector
61 Organic Electroluminescence Display Module

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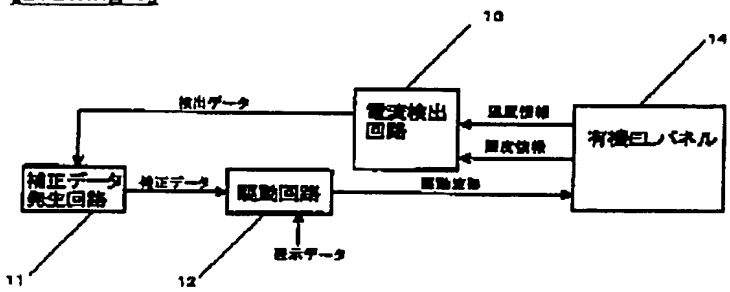
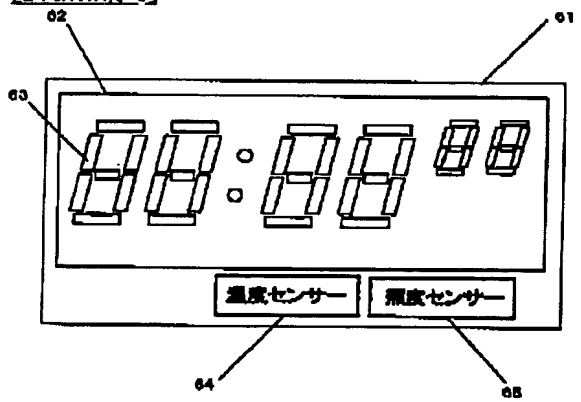
DRAWINGS

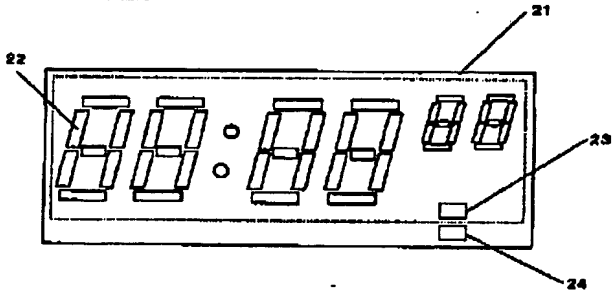
[Drawing 1]



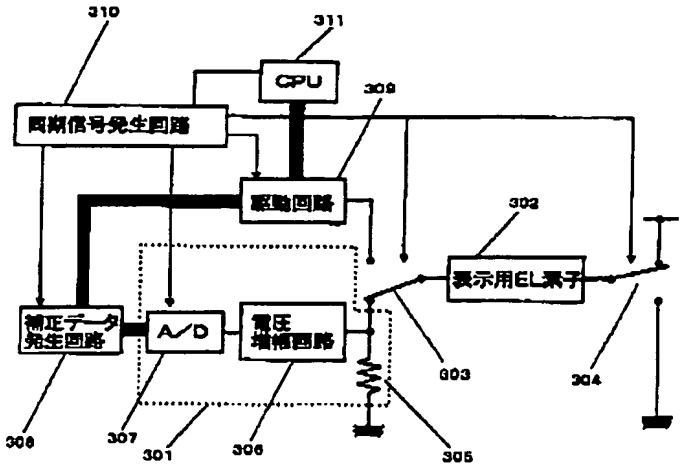
[Drawing 6]



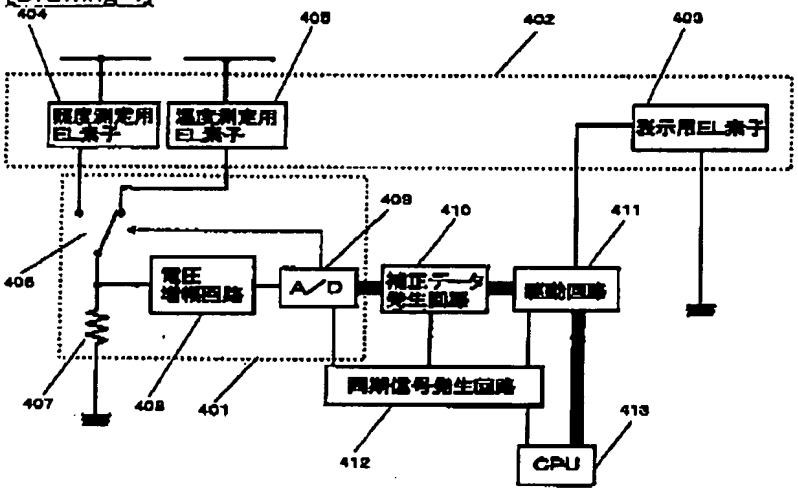
[Drawing 2]



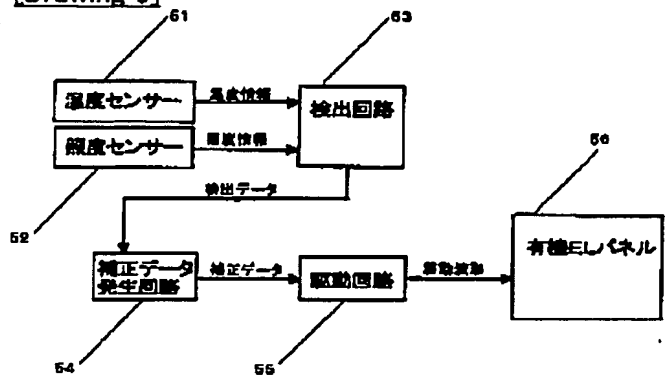
[Drawing 3]



[Drawing 4]



[Drawing 5]



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3/30		3/30	Ｋ	
Ｈ０５Ｂ　33/14		Ｈ０５Ｂ　33/14	Ａ	

審査請求　未請求　請求項の数13　ＯＬ　（全６頁）

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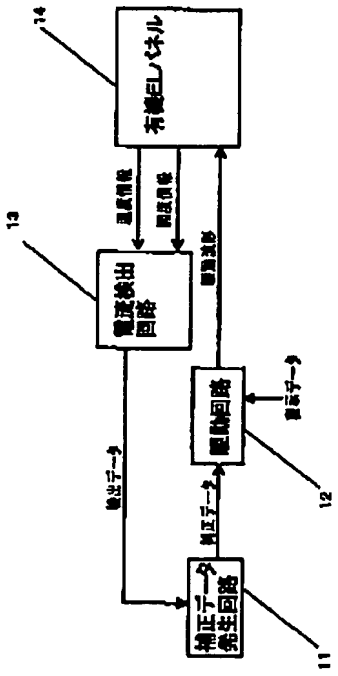
最終頁に続く

(54)【発明の名称】　有機ＥＬ表示装置、及び、有機ＥＬ素子の駆動方法

(57)【要約】
【課題】　発光表示パネルを用いて表示する場合、同じ発光輝度でも使用する環境により異なって見える問題があるが、これを外付けセンサーを用いずに解決させ、小型、軽量で見やすい表示が可能で余分な電力を使わない有機ＥＬ装置を実現させる。
【解決手段】　有機ＥＬ素子に一定の電圧を加えたときの電流値を測定することにより有機ＥＬパネルに照射されている光強度および有機ＥＬパネルの温度を測定する．ここで得られた情報を元に駆動回路において有機ＥＬパネルの発光輝度を最適に調整し、外部センサーを使わずに明るい場所では明るく発光して、暗い場所では眩しくない程度に発光させ見やすく奇麗な表示状態を実現する。



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【特許請求の範囲】

【請求項１】　情報を表示する表示要素有機ＥＬ素子と、温度または照度を測定するための測定用有機ＥＬ素子と、を備えることを特徴とする有機ＥＬ表示装置。

【請求項２】　前記測定用有機ＥＬ素子が、温度を測定するための温度測定用有機ＥＬ素子と、照度を測定するための照度測定用有機ＥＬ素子と、を個別に備えることを特徴とする請求項１に記載の有機ＥＬ表示装置。

【請求項３】　前記表示表示要素有機ＥＬ素子と前記測定用有機ＥＬ素子が同一の有機ＥＬパネルに設けられたことを特徴とする請求項１または２に記載の有機ＥＬ表示装置。

【請求項４】　前記温度測定用有機ＥＬ素子と前記照度測定用有機ＥＬ素子が同一の面積であることを特徴とする請求項２に記載の測定用の有機ＥＬ表示装置。

【請求項５】　前記照度測定用有機ＥＬ素子が前記表示要素有機ＥＬ素子を組み込む筐体により遮光されていることを特徴とする請求項２記載の有機ＥＬ表示装置。

【請求項６】　情報を表示する表示要素有機ＥＬ素子と、温度または照度を測定するための測定用有機ＥＬ素子と、前記測定用有機ＥＬ素子の測定結果に基づいて補正データを作成する補正データ発生回路と、前記補正データと表示データに応じた駆動波形を前記表示要素有機ＥＬ素子に印加する駆動回路と、を備えることを特徴とする有機ＥＬ表示装置。

【請求項７】　光が照射されている状態の有機ＥＬ素子に電圧を加えて電流値を測定することにより前記有機ＥＬ素子に照射されている光強度を測定し、前記測定結果に基づいて前記有機ＥＬ素子の発光強度を補正することを特徴とする有機ＥＬ素子の駆動方法。

【請求項８】　光が照射されている状態の有機ＥＬ素子に電圧を加えて電流値を測定することにより前記有機ＥＬ素子に照射されている光強度を測定し、前記測定結果に基づいて表示用有機ＥＬ素子の発光強度を補正することを特徴とする有機ＥＬ素子の駆動方法。

【請求項９】　有機ＥＬ素子を遮光して外光が照射されていない状態の有機ＥＬ素子に電圧を加えて電流値を測定することにより前記有機ＥＬ素子の温度を測定し、前記測定結果に基づいて前記有機ＥＬ素子の発光強度を補正することを特徴とする有機ＥＬ素子の駆動方法。

【請求項１０】　有機ＥＬ素子を遮光して外光が照射されていない状態の有機ＥＬ素子に電圧を加えて電流値を測定することにより前記有機ＥＬ素子の温度を測定し、前記測定結果に基づいて表示用有機ＥＬ素子の発光強度を補正することを特徴とする有機ＥＬ素子の駆動方法。

【請求項１１】　前記有機ＥＬ素子に加える前記電圧が逆バイアスであることを特徴とする請求項７～１０のいずれか１項に記載の有機ＥＬ素子の駆動方法。

【請求項１２】　光が照射されている状態の有機ＥＬ素子に電圧を加えて測定した電流値と、外光が照射されていない状態の前記有機ＥＬ素子に電圧を加えて測定した電流値との差を光強度として前記有機ＥＬ素子の発光強度を補正することを特徴とする有機ＥＬ素子の駆動方法。

2

【請求項１３】　光が照射されている状態の照度測定用有機ＥＬ素子に電圧を加えて測定した電流値と、外光が照射されていない状態の温度測定用有機ＥＬ素子に電圧を加えて測定した電流値との差を光強度として表示用有機ＥＬ素子の発光強度を補正することを特徴とする有機ＥＬ素子の駆動方法。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は有機ＥＬ素子を有する有機ＥＬ表示装置、及び有機ＥＬ素子の駆動方法に関し、有機ＥＬパネルの置かれる外部環境により表示エレメントの発光強度を変えて、常に最適な発光強度で表示するための補正回路に関するものである。

【０００２】

【従来の技術】従来の有機ＥＬ素子駆動方法のブロック図を図５に示す。また、図６は従来の有機ＥＬ表示モジュールの外観を示す平面図である。図５の温度センサー５１から温度情報、照度センサー５２から外部の照度情報が検出回路５３へ供給され、検出回路５３ではアナログで送られてくる温度情報、照度情報をデジタルデータに変換して補正データ発生回路５４へ送られる。補正データ発生回路５４では、検出データと有機ＥＬ素子の特性から予め決められた演算処理により発光輝度を決定し補正データとして駆動回路５５へ供給される。駆動回路５５は補正データと表示データより駆動波形を発生し有機ＥＬパネル５６へ印加する。

【０００３】図６に示すように、従来では温度センサー６４と光センサー６５が有機ＥＬパネル６２とは別に用意され、有機ＥＬ表示モジュール６１内に設置されている。温度センサー６４にはサーミスタ、熱電対等、照度センサーにはフォトダイオード、フォトトランジスタ等が用いられる。また、検出回路５３、補正データ発生回路５４、駆動回路５５は有機ＥＬ表示モジュール６１の背面に置かれる。

【０００４】以上のような構成により、有機ＥＬパネル５６は温度及び外部の照度で補正された輝度で発光し、明るい場所では明るく発光して、暗い場所では眩しくない程度に発光させることができる。

【０００５】

【発明が解決しようとする課題】表示器として発光表示パネルを用いる場合、使用する環境により同じ発光輝度でも異なって見える。太陽光などの強い外光の中では発光輝度を上げ、暗室などの暗い部屋の中では発光輝度を下げることにより見やすく奇麗な表示をさせる事ができる。また、腕時計など携帯機器の表示器においては、電池駆動のため、小型・ローパワーが要求され、使用する

環境により適度な発光輝度にすることにより余分な電力を使わずにすむ。そのため、従来の構成及び方法では、照度センサー６５、温度センサー６４を有機ＥＬパネル６２や駆動回路５５とは別に設けていた。そのため、有機ＥＬ表示モジュール６１が大きくなってしまい高価なものとなってしまい、また、センサーが有機ＥＬパネルと別に置かれているため誤差が生じる可能性がある、という問題があった。

【０００６】

【課題を解決するための手段】本発明の有機ＥＬ素子の駆動方法においては、上記課題を解決する手段として有機ＥＬ素子に一定の電圧を加えたときの電流値を測定することにより有機ＥＬパネルに照射されている光強度および有機ＥＬパネルの温度を測定する。ここで得られた情報を元に駆動回路において有機ＥＬパネルの発光輝度を最適に調整する。これにより、外部センサーを使わずに照度の異なる環境においても見やすく奇麗な表示をさせる事ができる。

【０００７】

【発明の実施の形態】以下に、本発明による有機ＥＬ表示装置及び有機ＥＬ素子の駆動方法の実施の形態を説明する。すなわち、本発明による有機ＥＬ表示装置は、情報を表示する表示要素有機ＥＬ素子と、温度または照度を測定するための測定用有機ＥＬ素子と、を備えることとした。そして、測定用有機ＥＬ素子が測定した温度または照度に基づいて有機ＥＬ表示装置の発光強度を補正することにより、周囲の環境に応じて発光輝度を調整することが可能になる。

【０００８】ここで、測定用有機ＥＬ素子として温度を測定するための温度測定用有機ＥＬ素子と照度を測定するための照度測定用有機ＥＬ素子とを共に搭載し、前述のように有機ＥＬ表示装置の発光強度を補正すれば、周囲の環境（温度、明るさ）における最適な輝度の表示を行うことが可能になる。また、表示に用いる有機ＥＬ素子と測定用有機ＥＬ素子を同一の有機ＥＬパネル内に設けることもできる。

【０００９】

【実施例】本発明の有機ＥＬ素子の駆動方法のブロック図を図1に示す。有機ＥＬパネル１４に設けられた温度及び照度測定用の有機ＥＬ素子に一定の電圧を加えたときの電流値を測定することにより温度情報及び照度情報を電流検出回路１３は受け取り補正データ発生回路１１に伝える。

【００１０】補正データ発生回路１１は電流検出回路１３より得られたデータと予め設定された照度と発光輝度の関係から補正データを駆動回路１２に伝える。駆動回路１２は補正データと表示データより駆動波形を発生させ有機ＥＬパネル１４に印加することにより外部環境に合った最適な輝度で発光させる。有機ＥＬ素子に逆バイアスで５Ｖを印加して、電流値を測定した結果を表１に示す。

【００１１】

【表１】

有機ＥＬ素子面積　２ｍｍ²
室温　２５℃

照度（１ｘ）	電流値（μＡ）
３２０	３．０
２５００	３．５

【００１２】本発明に関わる有機ＥＬパネル２１の平面図を図２に示す。有機ＥＬパネル２１には、比較的大きな８字形状の７セグメント表示要素２２が左側に４桁、比較的小さな８字形状の７セグメント表示要素が右側に２桁設けられている。この左側の４桁で時刻の時分を表示し、右側の２桁で秒の表示を行う時計表示用の発光表示パネルである。また、７セグメント表示要素２２以外に照度測定用ＥＬ素子２３が見切り内、温度測定用ＥＬ素子２４が筐体またはモジュールの外枠で遮光される位置に設けられている。

【００１３】図３に本発明の有機ＥＬ素子駆動方法の具体例を説明する回路図を示す。表示用ＥＬ素子３０２の端子にはスイッチ３０３、３０４が取り付けられ、駆動回路３０９とＧＮＤ間に接続して表示を行う状態とＶｃと電流検出回路３０１に接続して照度を測定する状態に切り替えられる。本実施例では、５Ｖ程度の高い電圧で測定できるため逆バイアスで印加しているが、発光しない程度の電圧であれば順バイアスでも構わない。

【００１４】電流検出回路３０１ではスイッチ３０３が抵抗３０５に接続され、抵抗３０５の両端の電圧を検出することにより電流値を測定する。具体的には抵抗３０５の両端の電圧を電圧増幅回路３０６で増幅後、Ａ／Ｄコンバータ３０７でデジタルデータに変換して検出データとして出力する。補正データ発生回路３０８では電流検出回路３０１で検出されたデータと予めＲＯＭ等で用意された照度と有機ＥＬ素子３０２の最適な発光輝度の関係から発光輝度を決定して、その補正データを駆動回路３０９に出力する。

【００１５】駆動回路３０９では補正データと表示データから駆動波形を作り表示用ＥＬ素子３０２を発光させる。また発光させている間はスイッチ３０３が駆動回路３０９にスイッチ３０４がＧＮＤに接続されている。同期信号発生回路３１０は、スイッチ３０３、３０４、Ａ／Ｄコンバータ３０７、補正データ発生回路３０８および駆動回路３０９に必要な同期信号を発生し供給している。

【００１６】図４は本発明の有機ＥＬ素子駆動方法の別の具体例を説明するための回路図である。有機ＥＬパネル４０２には表示用ＥＬ素子４０３の他に照度測定用ＥＬ素子４０４と温度測定用ＥＬ素子４０５が同一の工程で作成され、温度測定用ＥＬ素子４０５は筐体または

外枠等で遮光される位置に作成する，電流検出回路４０１ではスイッチ４０６が照度測定用ＥＬ素子４０４と温度測定用ＥＬ素子４０５に接続され，温度と照度を切り替えて測定できるようになっている。具体的には最初にスイッチ４０６が照度測定用ＥＬ素子４０４に接続され，抵抗４０７の両端の電圧を電圧増幅回路４０８で増幅後，Ａ／Ｄコンバータ４０９でデジタルデータに変換して温度誤差が含まれた照度データとして出力される，次にスイッチ４０６が温度測定用ＥＬ素子４０５に接続され同様の測定をして温度データとして出力される。

【００１７】補正データ発生回路４１０では電流検出回路４０１で検出された照度データより温度データを引いて照度データとし，最適な発光輝度を決定してその補正データを駆動回路４１０に出力する，照度と最適発光輝度，温度と発光輝度の関係は前例と同様に予めＲＯＭ等で用意される，駆動回路４１０では補正データと表示データから駆動波形を作り表示用ＥＬ素子４０３を発光させる。同期信号発生回路４１２はスイッチ４０６，Ａ／Ｄコンバータ４０９，補正データ発生回路４１０，駆動回路４１１に必要な同期信号を発生し供給している。

【００１８】ここで，電流測定方法として抵抗を挿入して電圧を測定する以外の方法でもよい。また，Ａ／Ｄ，補正データ発生回路，駆動回路はデジタルで処理する以外にアナログで処理しても構わない。

【００１９】

【発明の効果】本発明の有機ＥＬ素子駆動方法を用いる事により，外付けセンサーを用いずに外部環境に合わせた発光輝度で表示させることができ，小型，軽量で見やすい表示が可能な有機ＥＬ表示モジュールを提供できる，このため，腕時計などの，小型・ローパワー・ローコスト・ファッション性が要求される製品に用いると製＊品としての完成度を高める事ができ，本発明を用いる事による効果は大きい。

【図面の簡単な説明】

【図１】本発明の有機ＥＬ素子駆動方法のブロック図

【図２】図１の有機ＥＬ素子駆動方法で駆動する有機ＥＬパネルの平面図

【図３】本発明の有機ＥＬ素子駆動方法を説明するための回路図

【図４】本発明の別の有機ＥＬ素子駆動方法を説明するための回路図

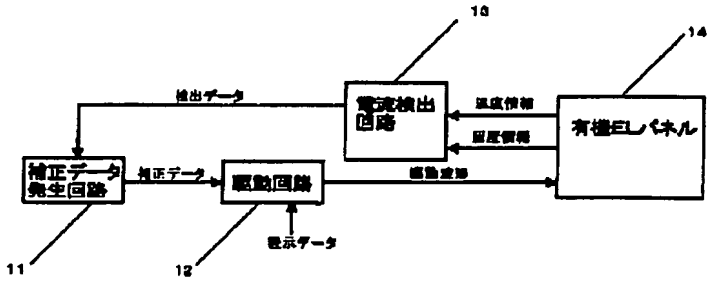
【図５】従来例を示すブロック図

【図６】従来例を示す有機ＥＬ表示モジュールの平面図

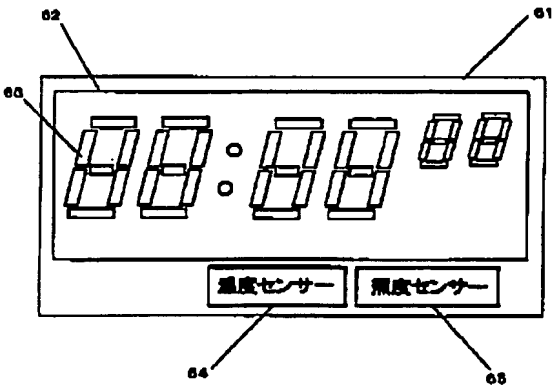
【符号の説明】

１１、３０８、４１０、５４　補正データ発生回路
１２、３０９、４１１、５５　駆動回路
１３、３０１、４０１　電流検出回路
１４、２１、４０２、５６、６２　有機ＥＬパネル
２２、３０２、４０３、６３　表示用ＥＬ素子
２３、４０４　照度測定用ＥＬ素子
２４、４０５　温度測定用ＥＬ素子
３０３、３０４、４０６　スイッチ
３０５、４０７　抵抗
３０６、４０８　電圧増幅回路
３０７、４０９　Ａ／Ｄコンバータ
３１０、４１２　同期信号発生回路
３１１、４１３　ＣＰＵ
５１、６４　温度センサー
５２、６５　照度センサー
５３　検出回路
６１　有機ＥＬ表示モジュール

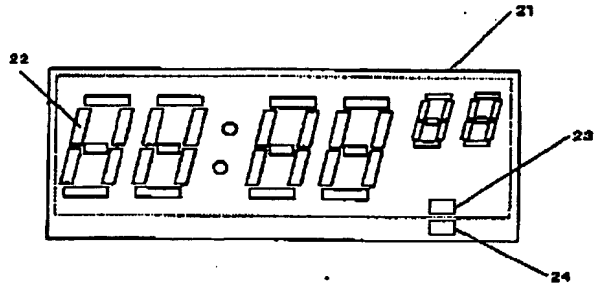
【図１】



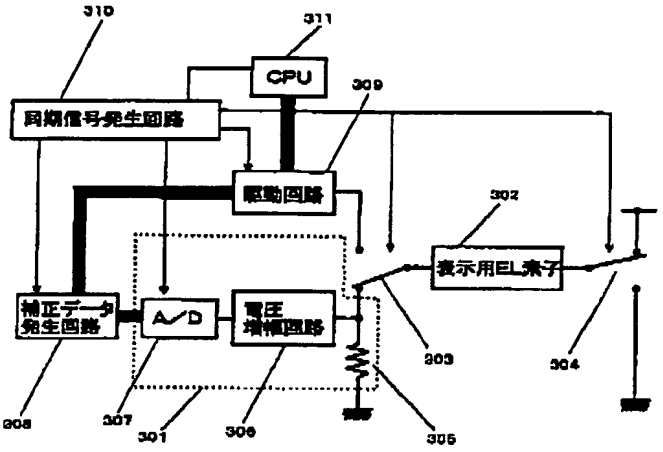
【図６】



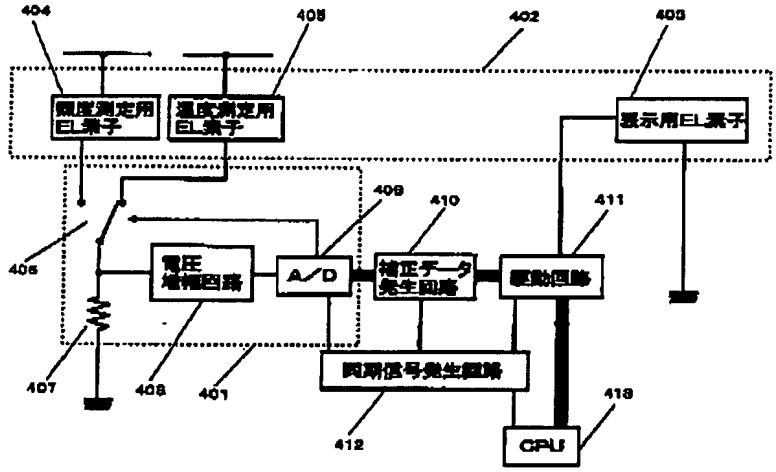
【図２】



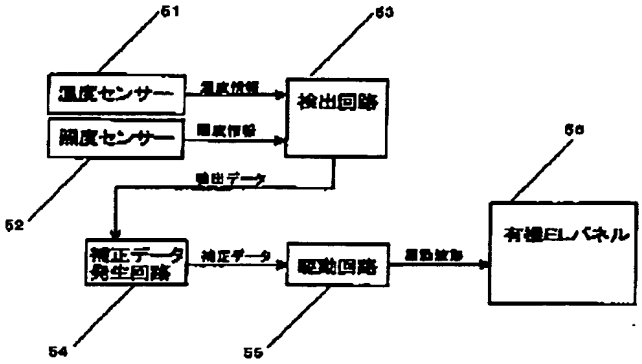
【図３】



【図４】



【図５】



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